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New species and records of Apseudomorpha (Crustacea: Tanaidacea) from Taiwan

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Abstract

The present study reports the first record of Apseudomorpha from Taiwan and includes descriptions of three new species and one new species record. *Paradoxapseudes pangcahi* **sp. nov.** differs from the most similar congener, *Paradoxapseudes littoralis,* by having one segment less in the antennal flagellum and fewer segments in the uropod endopod. *Pseudoapseudomorpha tagopilosus* **sp. nov.** is distinguished from its most similar congener**,** *Pseudoapseudomorpha ornata,* by having one long lateral seta on pleonite 4, a four-segmented antennular outer flagellum, and a male with smaller and thinner 'small' cheliped than that of the female and with vestigial pleopods on pleonite 3. *Indoapseudes multituberculata* **sp. nov.** stands out from its congeners by having pleopods only on the last two pleonites in females, many small tubercles terminally on the pleotelson, and mandibular palp article 1 with noticeable distal teeth. The *Synapseudes* species recorded in the present study morphologically agrees with *Synapseudes hansmuelleri* that was originally described from the Tioman Archipelago, Malaysia, South China Sea. Morphological comparisons between each of the three newly described species and its congeners are tabulated.

Key words: Taiwan, *Paradoxapseudes*, *Pseudoapseudomorpha*, *Indoapseudes*, *Synapseudes*

Introduction

Investigation on tanaidaceans on rocky shores of eastern Taiwan has been carried out since the Fall of 2009. A previous outcome of this investigation led to the description of two new species, *Aparatanais lenoprimorum* Tzeng & Hsueh, 2014 (family Paratanaidae) and *Tanais nuwalianensis* Tzeng & Hsueh, 2014 (family Tanaididae; see Bamber 2014) of the suborder Tanaidomorpha**.** In the same investigation, four species which belong to the suborder Apseudomorpha and superfamily Apseudoidea Leach, 1813 have also been recognised as members of four genera, namely *Paradoxapseudes* Guţu, 1991, *Pseudoapseudomorpha* Guţu, 1991, *Synapseudes* Miller, 1940, and *Indoapseudes* Băcescu, 1976.

With exception of *Synapseudes hansmuelleri* Guţu, 2006, the three other species examined in the present study are morphologically different from their congeners and considered new to science. Thus, the present study describes three new species and reports one new species record of apseudomorphan tanaidaceans from Taiwan.

Material and methods

Specimens were collected from macroalgae, eunicid worm tubes, and sandy bottom at intertidal rocky habitats on the eastern coast of Taiwan from October 2009 to July 2013. These specimens were then sorted from washings of those materials and preserved in 70% alcohol. Some specimens were dissected for species identification. Drawings were prepared by tracing outlines of examined body parts from digitised images using CorelDRAW® GRAPHIC SUITE X5. Morphological terminology used in the present study mainly followed Larsen (2003), with exception of setal terms. We use 'plumose setae' for the generally long and flexible setae that have relatively large side setules,

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'broom setae' for the generally short and fine sensory setae with a few distal side setules, 'pinnate setae' for the single-sided setulated setae, and 'spines' for the stiff and rigid type of setae. All examined specimens are deposited at National Museum of Natural Science (NMNS), Taichung, Taiwan.

Taxonomy

Order Tanaidacea Dana, 1849

Suborder Apseudomorpha Sieg, 1980

Superfamily Apseudoidea Leach, 1813

Family Apseudidae Leach, 1813

Subfamily Apseudinae Leach, 1813

Paradoxapseudes Guţu, 1991

Type species. *Paradoxapseudes cubensis* Guţu, 1991

Remarks. Guţu (1991a) erected the monotypic genus *Paradoxapseudes* on the basis of one main morphological character—the absence of the inner flagellum of the antennule and assigned the genus to the Tanapseudidae Băcescu, 1978. The genus was later transferred to the family Apseudidae by Guţu (2001), according to the pereopodal morphology and the presence of several common features of *Paradoxapseudes* and *Gollumudes* Bamber, 2000. Guţu (2008) later emended the diagnosis of the genus and synonymised *Gollumudes* with *Paradoxapseudes*. To date, fifteen species are recognised for the genus, including the type species, ten new combinations, and four newly described species. The present study adds one new species to the genus.

Paradoxapseudes pangcahi sp. nov.

Figs 1–3

Material examined. *Holotype*: non-ovigerous female (NMNS7339-1), 2.1 mm, Jialulan (22°48'10.2"N, 121°11'57.0"E), eastern Taiwan, intertidal, washing from green alga *Chlorodesmis* sp., collected by You-Wei Tzeng, April 20, 2012.

Allotype: male (NMNS7339-2), 1.9 mm, same collection data as holotype.

Paratypes: one male (NMNS7339-3), 1.9 mm, one female (NMNS7339-4), 1.4 mm, three mancae II and two mancae III (NMNS7339-7), four females and two males (NMNS7339-8), same collection data as holotype; one male (NMNS7339-5), 1.5 mm, Jihuei (23°06'54.9"N, 121°24'16.3"E), eastern Taiwan, intertidal, washing from red alga *Melanamansia* sp., collected by You-Wei Tzeng, August 18, 2012; one male (NMNS7339-6), 1.2 mm, Jihuei (23°06'54.9"N, 121°24'16.3"E), eastern Taiwan, intertidal, washing from red alga *Melanamansia* sp., collected by You-Wei Tzeng, April 18, 2012.

Diagnosis. *Female*: *Antennule* outer flagellum five-segmented; inner flagellum two-segmented. *Antenna* flagellum four-segmented. *Cheliped* carpus ventral margin with two spine-like apophyses; dactylus incisive margin with three tubercles. *Pereopod 1* basis with three dorsal plumose setae; propodus with three ventral spines. *Pereopod 6* basis with ten dorsal plumose setae. *Uropod* exopod five-segmented, endopod with nine to twelve segments.

Description. *Female, holotype*: *Habitus* (Fig. 1A) body dorsoventrally flattened, about six times as long as wide. *Cephalothorax* about 0.2 times as long as body, about 1.3 times as long as wide, with two well-separated eye-lobes, rostrum short, obtuse triangular. *Pereon* with all pereonites shorter than broad; pereonite 1 shortest, 0.3 times as long as wide, without lateral projection; pereonite 2 slightly longer than pereonite 1, with one anterolateral blunt projection and one lateral seta; each of pereonites 3–4 about two times as long as pereonite 1, with one lateral blunt

projection terminated by a single seta; pereonite 5 longest, a little longer than pereonite 4, with one lateral blunt projection terminated with two setae; pereonite 6 with eight lateral plumose setae. *Pleon* more than 0.25 times as long as body; pleonites 1–4 laterally narrowed, with three lateral plumose setae; pleonite 5 with two lateral plumose setae. *Pleotelson* about 0.4 times as long as pleon, with two weak lateral projections, four dorsal plumose setae and four lateral plumose setae.

Antennule (Fig. 1B) about 1.6 times as long as cephalothorax; peduncle article 1 about 0.4 times as long as antennule, with eight broom setae on outer margin and three broom setae, five small teeth and one cluster of five setae on inner margin; article 2 about 0.3 times as long as article 1, with four distal broom setae, two distal setae and one broom setae on inner margin; article 3 shorter than article 2, with two distal setae and one lateral seta; article 4 with one distal broom seta and two simple setae. Outer flagellum five-segmented; segment 1 with one distal seta; segment 2 longest, with two distal setae; segment 3 with one distal seta; segment 4 with four distal setae and one aesthetasc; segment 5 very short, with three distal setae. Inner flagellum 0.5 times as long as outer flagellum, with two segments similar in length; segment 1 with one distal seta; segment 2 with three distal setae.

Antenna (Fig. 1C) peduncle five-articled, article 2 with apparently four broom setae; article 3 much shorter than articles 4 and 5, with one broom distal seta, article 4 with one broom distal seta, article 5 as long as article 4, with two distal setae and two broom setae; flagellum four-segmented, all segments similar in length, segment 1 with two distal setae, segment 2 with one distal seta, segment 3 with four distal setae, segment 4 with five distal setae; squama present, attached distally on peduncle article 2, with four distal setae.

Labrum (Fig. 1D) with middle of distal margin slightly depressed and covered by two rows of setules, basal part with two lobes. *Right mandible* (Fig. 1E) incisor with four denticles, setal row with three multifurcate setae and one strong bifurcate seta; molar (Fig. 1F) apex with corrugated triturative surface, outer margin near palp denticulate; palp (Fig. 1E) three-articled, article 1 shortest, with two simple and one pinnate setae, article 2 with nine finely pinnate setae, article-3 with four pinnate setae and four simple distal setae. *Left mandible* (Fig. 1G) similar to right mandible but *lacinia mobilis* present, three-denticled. *Labium* (Fig. 1H) palp about 2.7 times as long as wide and distally narrowed, covered by setules and with three apical setae; lobe with few setules and one seta near palp. *Maxillule* (Fig. 1I) palp two-articled, with three distal setae; outer endite with eleven distal spines and two small plumose setae, and with one row of setules along outer margin; inner endite with four distal plumose setae. *Maxilla* (Fig. 2A) outer margin with one row of setules; outer lobe of movable endite with two pinnate setae and four simple setae; inner lobe of movable endite with six setae; outer lobe of fixed endite with four distal setae and three multifurcate setae; inner lobe of fixed endite with one row of 17 simple setae and two longer bipinnate setae. *Maxilliped* (Fig. 2B) basis inner margin with two long distal plumose setae; endite (Fig. 2C) with eight multifurcate setae and two simple setae on distal margin, inner margin with two coupling hooks and six plumose setae; palp article 1 inner margin with one long distal plumose seta, outer margin with one distal seta; article 2 inner margin with three plumose and 13 simple setae, outer margin with one strong distal spine; article 3 inner margin with seven simple setae; article 4 with nine distal setae.

Cheliped (Fig. 2D) robust; exopod three-articled, distal article with four plumose setae; basis 1.5 times as long as wide, having ventral margin with one median spine and two distal plumose setae; merus distoventral margin with one seta and several weak projections; carpus about as long as basis, 1.5 times as long as wide, ventral margin with two strong pointed apophyses and five setae; propodus (including fixed finger) about as long as carpus, palm broad and rounded, fixed finger thick, distally acute, outer margin with three setae, incisive margin with one strong denticulate triangular process, one low blunt denticulate process and eight setae; dactylus slightly curved, about 0.5 times as long as propodus, with three distodorsal setae, incisive margin with three small and rounded tubercles and one short spine.

Pereopod 1 (Fig. 3A) exopod three-articled, distal article with five plumose setae; coxa with blunt apophysis covered with three plumose setae and two short simple setae; basis 2.5 times as long as wide, with three dorsal plumose seta, ventral margin with two plumose seta, one long and two short distal simple setae; ischium with three distoventral setae; merus 0.5 times as long as basis, with one distodorsal spiniform seta, one distodorsal simple seta and one lateral broom seta, ventral margin with four setae and one spine distally; carpus shorter than merus, with six dorsal setae, one distodorsal spines and one lateral seta, ventral margin with two robust spines and seven setae; propodus a little shorter than carpus, with one lateral broom seta, dorsal margin with three simple setae and two spines, ventral margin with four setae and three spines; dactylus plus unguis shorter than propodus. *Pereopod 2* (Fig. 3B) coxa without prominent apophysis, with one plumose setae; basis narrow, about 3.5 times as long as

wide, with one dorsal seta, two ventral setae and three distoventral setae; ischium with two distoventral setae; merus with three distodorsal setae, two distoventral spines and three ventral setae; carpus as long as merus, with cluster of four distodorsal setae, one spine and one setulate seta, ventral margin with three spines and one seta; propodus longer than carpus, with one dorsal simple seta and two distodorsal spines and one pinnate seta, ventral margin with four spines, one simple and one setulate seta; dactylus plus unguis nearly as long as propodus, more curved than dactylus of pereopod 1, with one ventral seta. *Pereopod 3* (Fig. 3C) almost same as pereopod 2 but somewhat shorter. Spines on pereopods 1–3 serrate.

Pereopod 4 (Fig. 3D) coxa with one seta; basis approximately three times as long as wide, with four lateral setae and two distoventral setae; ischium short, with two distoventral setae; merus about two times as long as ischium, with one distodorsal seta, two distoventral setae and two spines; carpus about two times as long as merus, ventral margin with two middle spines, distal margin with three lateral spines, two lateral setae, two medial spines, and two medial setae; propodus as long as carpus, with distal row of eight pinnate setae of equal length and one subdistal row of setae with two setulate setae, three longer pinnate setae and one longest simple setae; dactylus relatively small, together with unguis shorter than propodus. *Pereopod 5* (Fig. 3E) coxa with one seta; basis about 3.2 times as long as wide, with one proximodorsal seta, one medial seta, one ventral seta and two distoventral setae; ischium relatively longer comparing to pereopods 1–4, with one distodorsal seta and two distoventral setae; merus 3.5 times shorter than basis, with one long dorsal seta, two distoventral setae and a pair of distoventral spines; carpus 1.5 times as long as merus, with one distodorsal seta, one medial seta, one ventral seta, and two pairs of spines; propodus about as long as carpus, with two distodorsal setae, one distodorsal spine, and one medial seta, ventral margin with one middle and one distal spines, and one comb-like row of eight pinnate setae between the two robust spines. *Pereopod 6* (Fig. 3F) basis thicker than pereopod 5 basis, with five dorsal medial plumose setae and one distal medial cluster of five plumose setae, ventral margin with one simple setae and two distal broom setae; ischium with three distoventral setae; merus approximately 2.2 times as long as ischium, with two dorsal plumose setae, one lateral medial simple seta and two distoventral simple setae; carpus 1.3 times as long as merus, having dorsal margin with one middle plumose seta, one distal plumose seta and two distal short simple setae, ventral margin with one middle seta and three distal setae; propodus distal margin with three pinnate setae, three setulate setae and one spine, ventral margin with one proximal and one distal spines, and comb-like row of nine pinnate setae between the two robust spines.

Pleopod (Fig. 3G) basal article with two outer plumose setae; exopod and endopod both with seven plumose setae.

Uropod (Fig. 3H) about twice as long as pleotelson; basal article with one long distal seta; exopod five-segmented, segments 2–5 with one seta each; endopod nine-segmented, segments 5–7 each with one distal seta, segment 8 naked, segment 9 with five distal setae; uropod endopod nine-segmented.

Variation. Uropod endopod can have between nine (holotype) and twelve segments (as in some female paratypes).

Male allotype: Similar to female but *antennule* with six-segmented outer flagellum, *antenna* with five-segmented flagellum, dimorphic chelipeds, and *uropods* with 13-segmented endopod. *Small cheliped* same as female cheliped. *Large cheliped* (Fig. 2E) more robust than female cheliped, with one distal apophysis on merus; carpus thick, 1.1 times as long as wide, with larger ventral spine-like apophyses; palm enlarged, fixed finger short, 0.7 times as long as wide; dactylus strongly curved.

Etymology. The name is derived from the Pangcah aboriginal tribe of eastern Taiwan, as a tribute to their glittering cultures.

Type locality. Jialulan, eastern Taiwan.

Distribution. It is only known from Jialulan and Jihuei, eastern Taiwan.

Remarks. The present species closely resembles *Paradoxapseudes littoralis* (Shiino, 1952) from Japan (Table 1). Both species have two prominent pointed apophyses on the ventral margin of the cheliped carpus, three ventral spines on pereopod 1 propodus, and two outer setae on pleopod basal article (Shiino 1952: Figs 4–5; preset study: Figs 1–3, Table 1). Nevertheless, *Paradoxapseudes pangcahi* **sp. nov.** can be distinguished from *P. littoralis* by having 1) one more segment on both the outer and inner flagellae of the antennule, 2) one less segment on the antennal flagellum, 3) two more distal setae on labial palp, 4) one more distal setae on maxillule palp, 5) three dorsal plumose setae on pereopod 1 basis, not four simple setae, 6) two more dorsal plumose setae on pereopod 6 basis, and 7) nine to 12-segmented uropod endopod, in contrast to 14-segmented uropod endopod (Shiino 1952: Figs 4–5; present study: Figs 1–3, Table 1).

TABLE 1. Key morphological characters of all species described for *Paradoxapseudes*. References: Băcescu (1980), Bamber (1997), Bamber & Błażewicz-Paszkowycz (2013), Błażewicz-Paszkowycz & Bamber (2012), Edgar (1997), Guţu (1991a), Guţu (2001b), Guţu (2007), Guţu (2008), Hansen (1895), Menzies (1953), Miller (1940), Shiino (1952), Sieg (1986). NA not available from original description. * Indicates data from Guţu (2008).

	Antennule outer/inner flagellum segments	Antenna flagellum segments	Cheliped carpus ventral apophyses	Pereopod 1 basis dorsal plumose setae	Pereopod 1 propodus ventral spines	Pereopod 6 basis dorsal plumose setae	Uropod exopod/endopod segments
P. pangcahi **sp. nov.**	5/2	4	2	3	3	10	5/9–12
P. attenuata	7/3	5	absent	absent	4	4	4/17
P. basibadens	7/3	5	absent	5	3	4	5/22–23
P. bassoprofundo	7/3	5	absent	absent	4	5	5/17
P. bermudeus	7/3	5?	1	NA	3	6	5/14-18
P. botosaneanui	7/3	5	absent	5	3	12	5/22–23
P. cubensis	5–8/1–3	5	NA	4	3	5	5/16–18
P. edgari	7/3	5	absent	absent	3	6	5/17
P. garthi	6/2	5	1	3	3	9	5/13
P. heroae	7/3	5	2	absent	4	5	5/18
P. intermedius	7/3	4	NA	5*	4*	12*	4/NA
P. larakia	7/2–3	5	absent	3–4	4	6	3/15
P. littoralis	4/1	5	2	absent	3	8	5/14
P. mortoni	7/3	5	3	absent	3	?	2/6
P. paneacis	7/3	4	1	4	4	7	>4/14
P. tropicalis	6/3	NA	2	NA	3?	NA	5/12

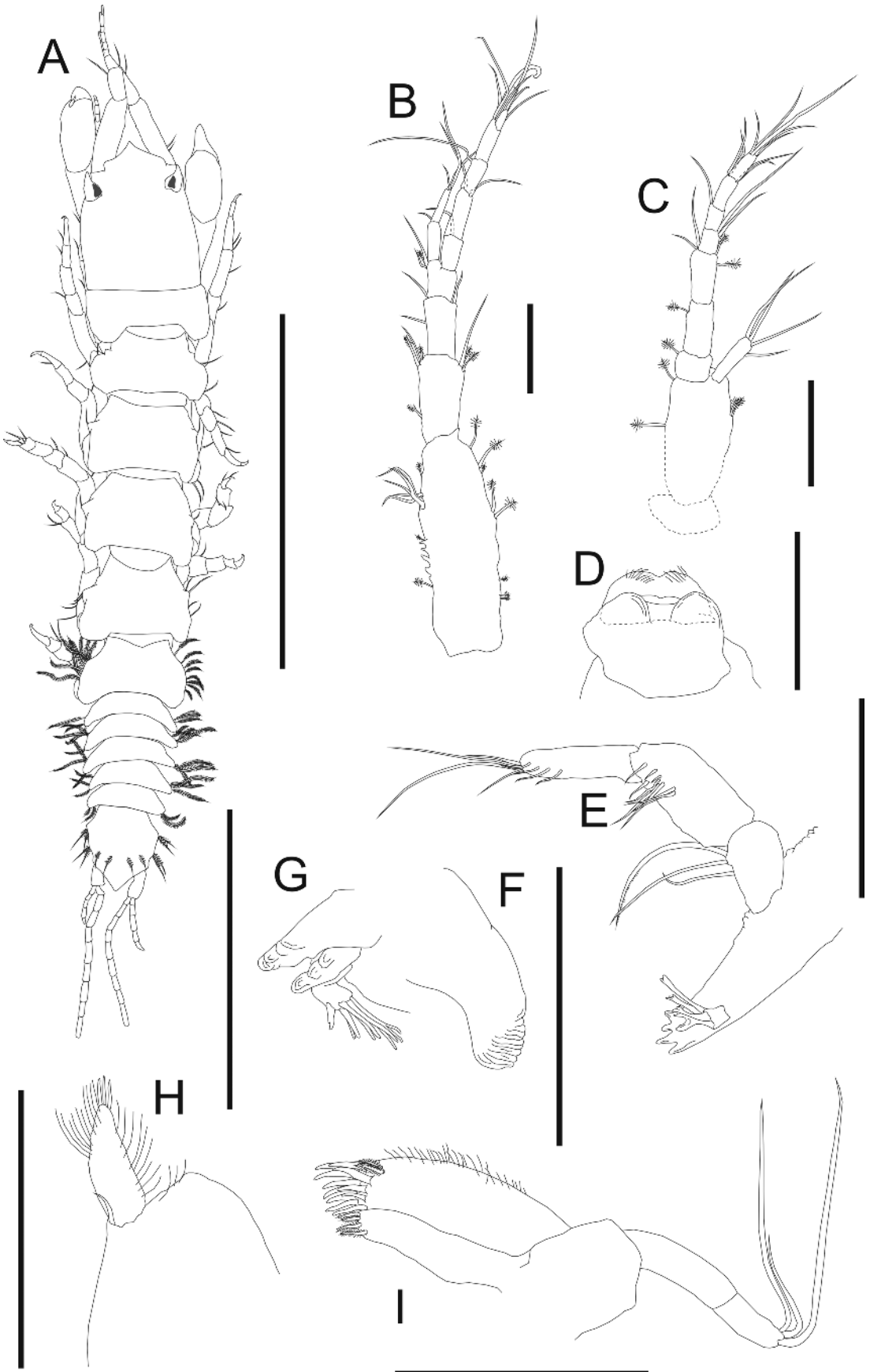

FIGURE 1. *Paradoxapseudes pangcahi* **sp. nov.** Holotype female (NMNS7339-1): **A** body dorsal view; **B** right antennule; **C** right antenna; **D** labrum; **E** right mandible; **F** right mandible molar; **G** left mandible incisor, *lacinia mobilis* and setal row; **H** labium; **I** right maxillule. Scale: A, 1 mm; B–I, 0.1 mm.

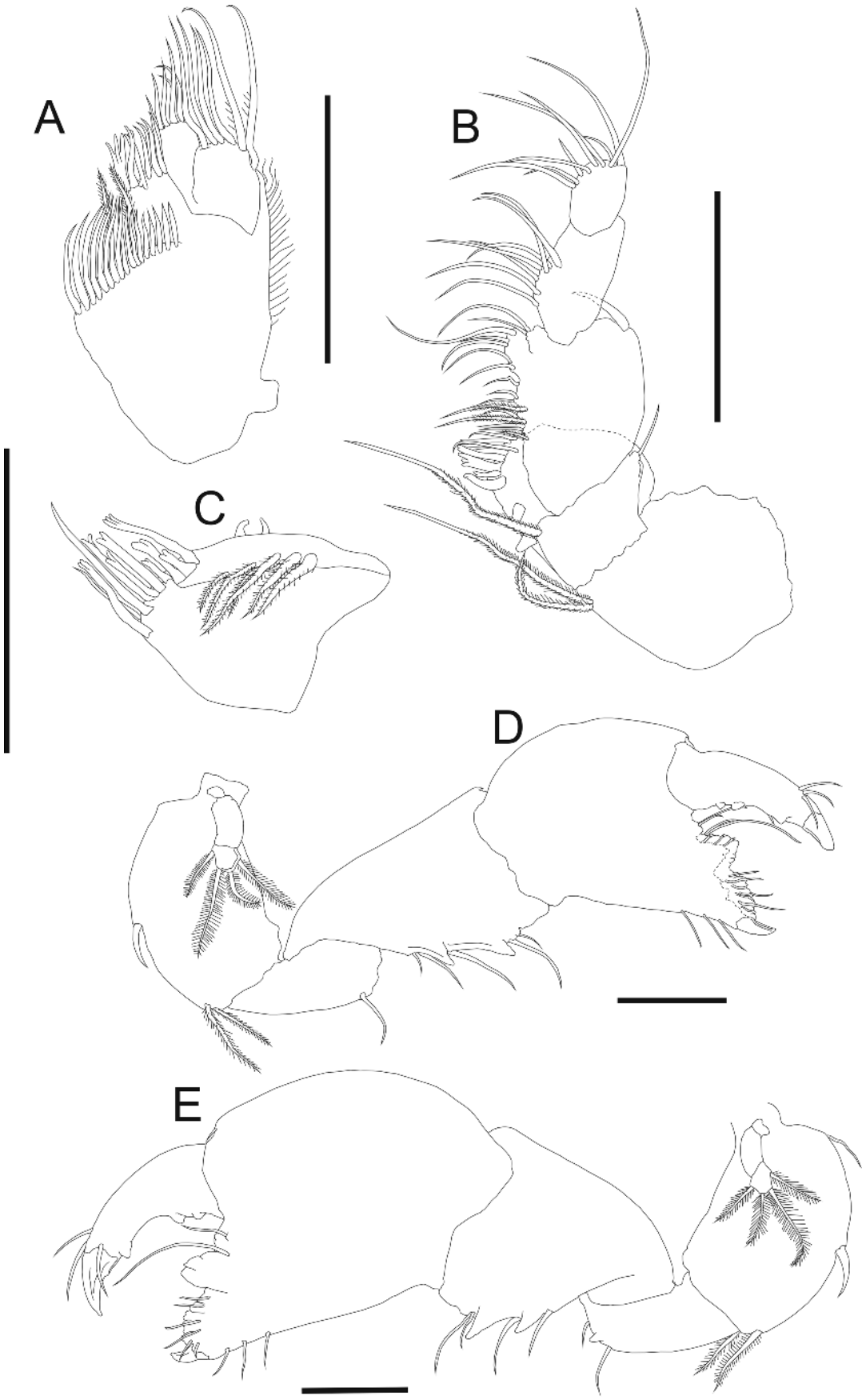

FIGURE 2. *Paradoxapseudes pangcahi* **sp. nov.** Holotype (NMNS7339-1) female: **A** maxilla; **B** left maxilliped; **C** left maxilliped endite; **D** right cheliped; **E** allotype male (NMNS7339-2), left cheliped. Scale: A–E, 0.1 mm.

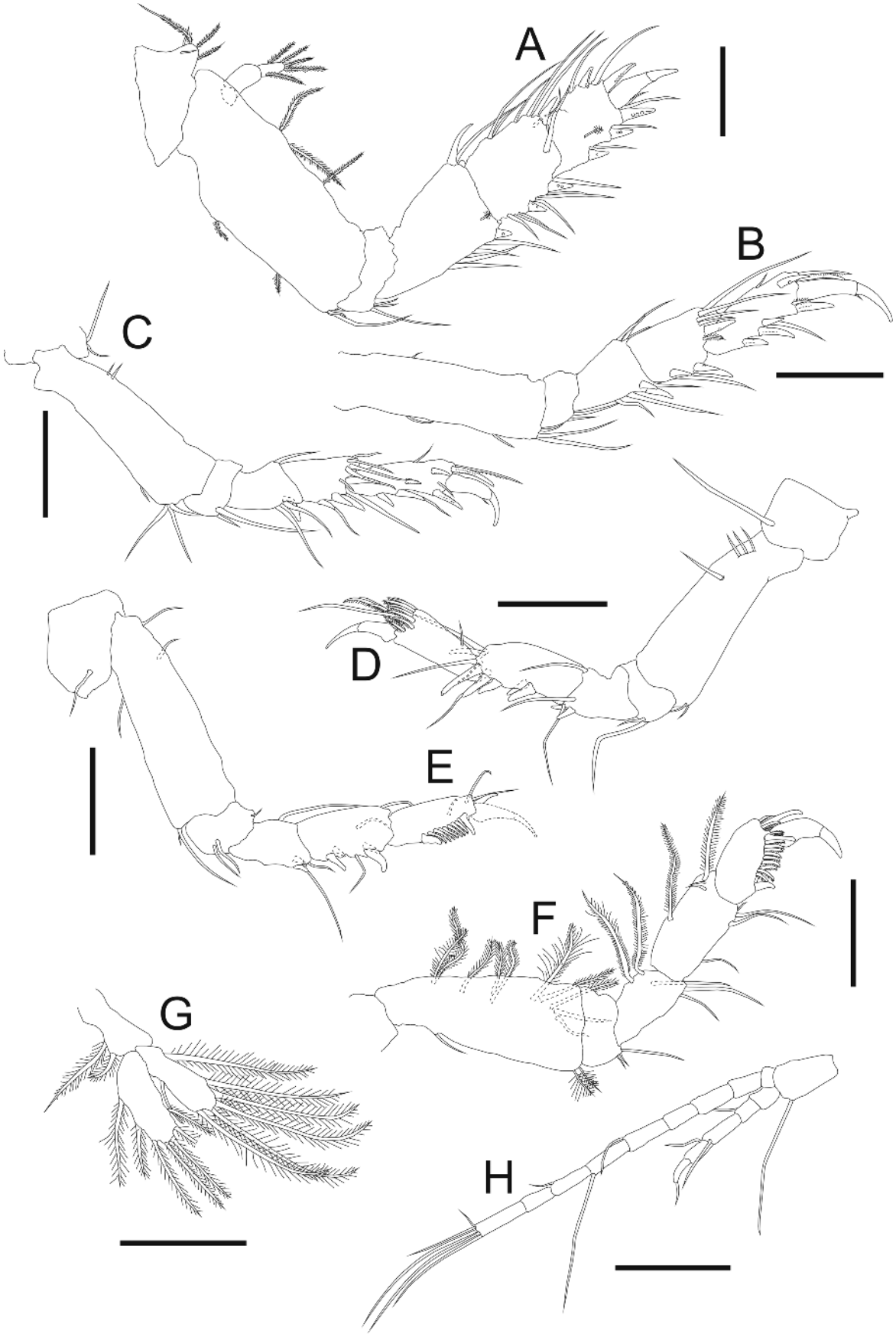

FIGURE 3. *Paradoxapseudes pangcahi* **sp. nov.** Holotype (NMNS7339-1) female: A–C right pereopods 1–3, respectively; **D** left pereopod 4; **E–F** right pereopods 5–6, respectively; **G** right pleopod 2; **H** right uropod. Scale: A–H, 0.1 mm.

Family Metapseudidae Lang, 1970

Subfamily Metapseudinae Lang, 1970

***Pseudoapseudomorpha* Guţu, 1991**

Type species *Pseudoapseudomorpha madagascariensis* Guţu, 1991.

Remarks. Guţu (2006) emended the generic diagnosis to replace that of the monotypic genus, which was erected on the basis of two incomplete juvenile specimens (Guţu 1991b). In the same paper, he added two new species (*Pseudoapseudomorpha ornata* Guţu, 2006 and *Pseudoapseudomorpha tanzaniana* Guţu, 2006) and one new combination (*Pseudoapseudomorpha wagait* (Edgar, 1997)). Two more species (*Pseudoapseudomorpha curtisetosa* Guţu, 2009 and *Pseudoapseudomorpha gomezi* Guţu & Ortiz, 2009) were described in 2009 (Guţu 2009, Guţu & Ortiz 2009). The present study adds one species to the genus.

***Pseudoapseudomorpha tagopilosus* sp. nov.**
Figs 4–7

Material examined. *Holotype*: female (NMNS7340-1), 2.3 mm, Jihuei (23°06'54.9"N, 121°24'16.3"E), eastern Taiwan, intertidal, washing from red alga *Jania* sp., collected by You-Wei Tzeng, August 18, 2012.

Allotype: male (NMNS7340-2), 1.9 mm, same collection data as holotype.

Paratypes: one female (NMNS7340-3), 1.5 mm and three males (NMNS7340-5), Jialulan (22°48'10.2"N, 121°11'57.0"E), eastern Taiwan, intertidal, washing from red alga *Mastophora* sp., collected by You-Wei Tzeng, April 20, 2012; one post-ovigerous female and two males (NMNS7340-4), same collection data as holotype.

Diagnosis. *Female*: *Pleonites* 2, 3 and 4 with one long lateral plumose seta. *Antennule* with four-segmented outer flagellum and three-segmented inner flagellum. *Antenna* peduncle article 1 inner expansion ovate, denticulate; flagellum three-segmented. *Maxillule* palp article 2 with five setae. *Cheliped* exopod article 3 with six distal plumose setae. *Pereopods 1–2* propodus with six ventral spines. *Pereopod 4* carpus with ten ventral spines. *Pleopod* absent. *Uropod* with five-segmented exopod and eight-segmented endopod.

Description. *Holotype*: *Habitus* (Fig. 4A) body dorsoventrally flattened, about five times as long as wide. *Cephalothorax* about 0.25 times as long as body, with well-separated eye-lobes; rostrum (Fig. 4B) acute, covered by many tubercles; carapace dorsal surface with several grooves and paired lateral plumose setae. *Pereon* with all pereonites much shorter than broad; pereonites 1 and 2 shortest and widest, without lateral projections, with two dorsal plumose setae and two pairs of lateral plumose setae; pereonite 3 longer and narrower than pereonite 2, with two dorsal and two pairs of lateral plumose setae; pereonites 4–5 with one lateral blunt projection, two dorsal and three pairs of lateral plumose setae; pereonite 6 narrowest, with one lateral blunt projection, two dorsal and six paired lateral plumose setae. *Pleon* (Fig. 4C) short, about 0.15 times as long as body; pleonite 1 naked; pleonite 2 laterally pointed, with two dorsal and one paired lateral long plumose setae; pleonites 3–4 laterally pointed, with one paired lateral long plumose seta; pleonite 5 with one paired lateral short plumose setae. *Pleotelson* with four dorsal plumose setae, terminally pointed, with one apophysis (Fig. 7G).

Antennule (Fig. 4D) about 1.4 times as long as cephalothorax; peduncle article 1 almost 0.5 times as long as antennule, outer margin with one pointed apophysis, three plumose setae, and clusters of broom setae and setules, inner margin with five pointed apophyses and seven plumose setae, distal margin with inner and outer pointed apophyses; article 2 a quarter as long as first article, outer margin with cluster of broom setae and setules, inner margin with two plumose setae and one distal apophysis; article 3 as long as article 2, with one outer distal plumose seta and four inner plumose setae; article 4 with two inner plumose setae and one simple distal seta; outer flagellum four-segmented, segment 1 with one distal plumose and simple seta, segment 2 with one aesthetasc and three plumose and four simple distal setae, segment 3 with one aesthetasc and three distal setae, segment 4 with one aesthetasc and five distal setae; inner flagellum three-segmented, about 0.5 times as long as outer flagellum, segment 1 with two distal plumose setae, segment 2 with two distal plumose and one simple setae, segment 3 with five distal setae.

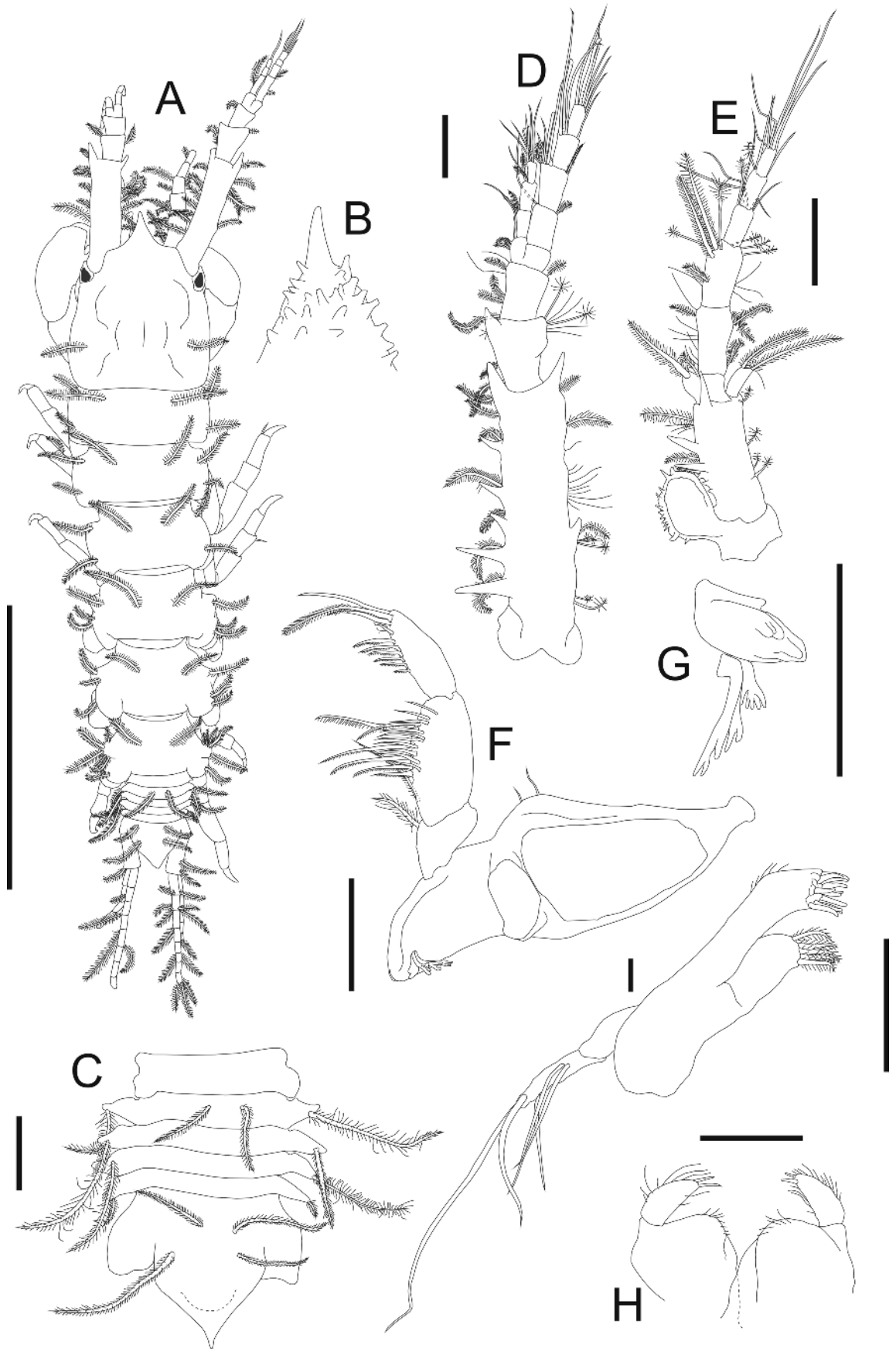

FIGURE 4. *Pseudoapseudomorpha tagopilosus* **sp. nov.** Holotype (NMNS7340-1) female: **A** body dorsal view; **B** rostrum; **C** pleon; **D** right antennule; **E** right antenna; **F** right mandible; **G** left mandible *lacinia mobilis* and setal row; **H** labium; **I** left maxillule. Scale: A, 1 mm; B–F, H–I, 0.1 mm; G, 0.5 mm.

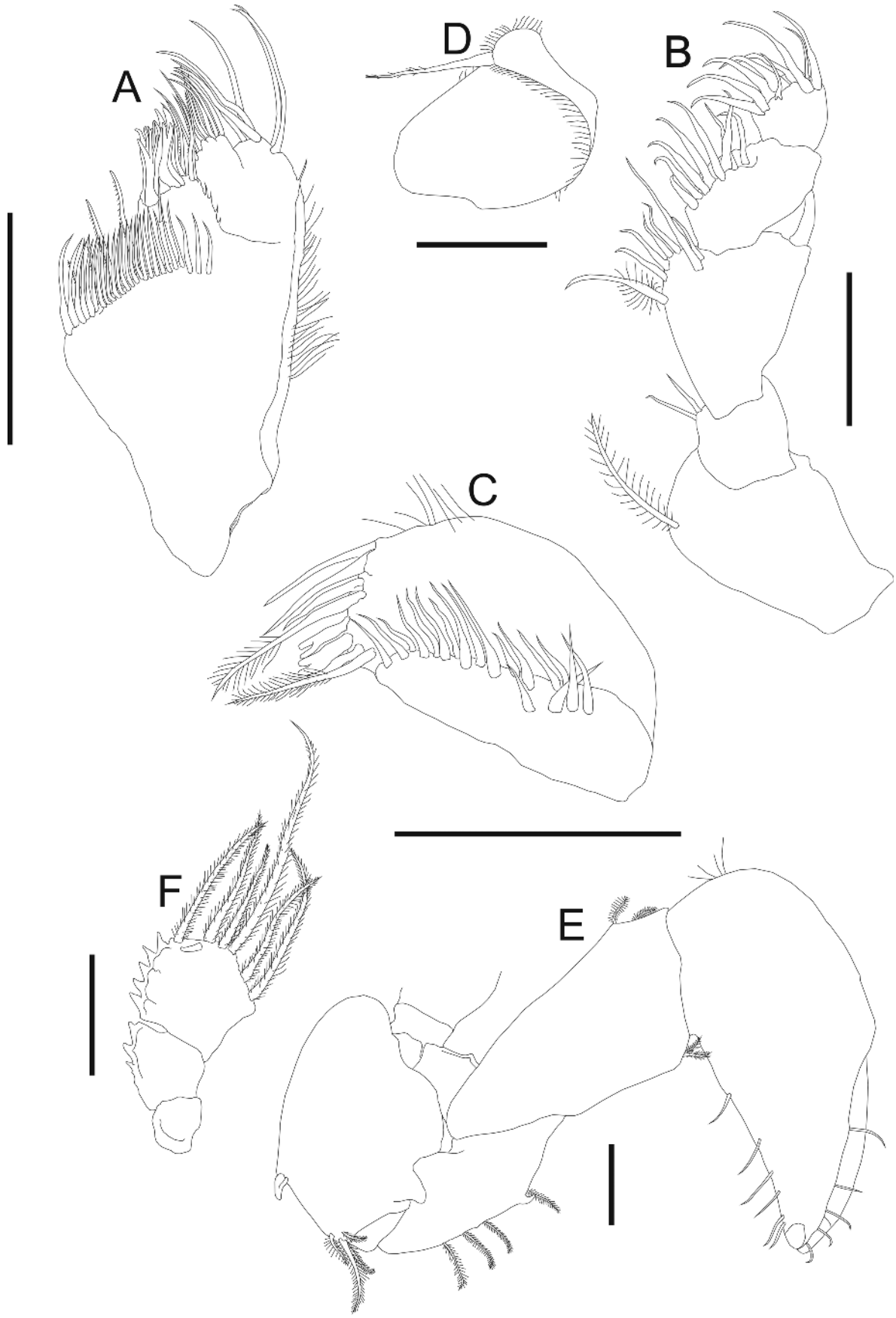

FIGURE 5. *Pseudoapseudomorpha tagopilosus* **sp. nov.** Holotype (NMNS7340-1) female: **A** maxilla; **B** left maxilliped; **C** left maxilliped endite; **D** epignath; **E** right cheliped; **F** left cheliped exopod. Scale: A–F, 0.1 mm.

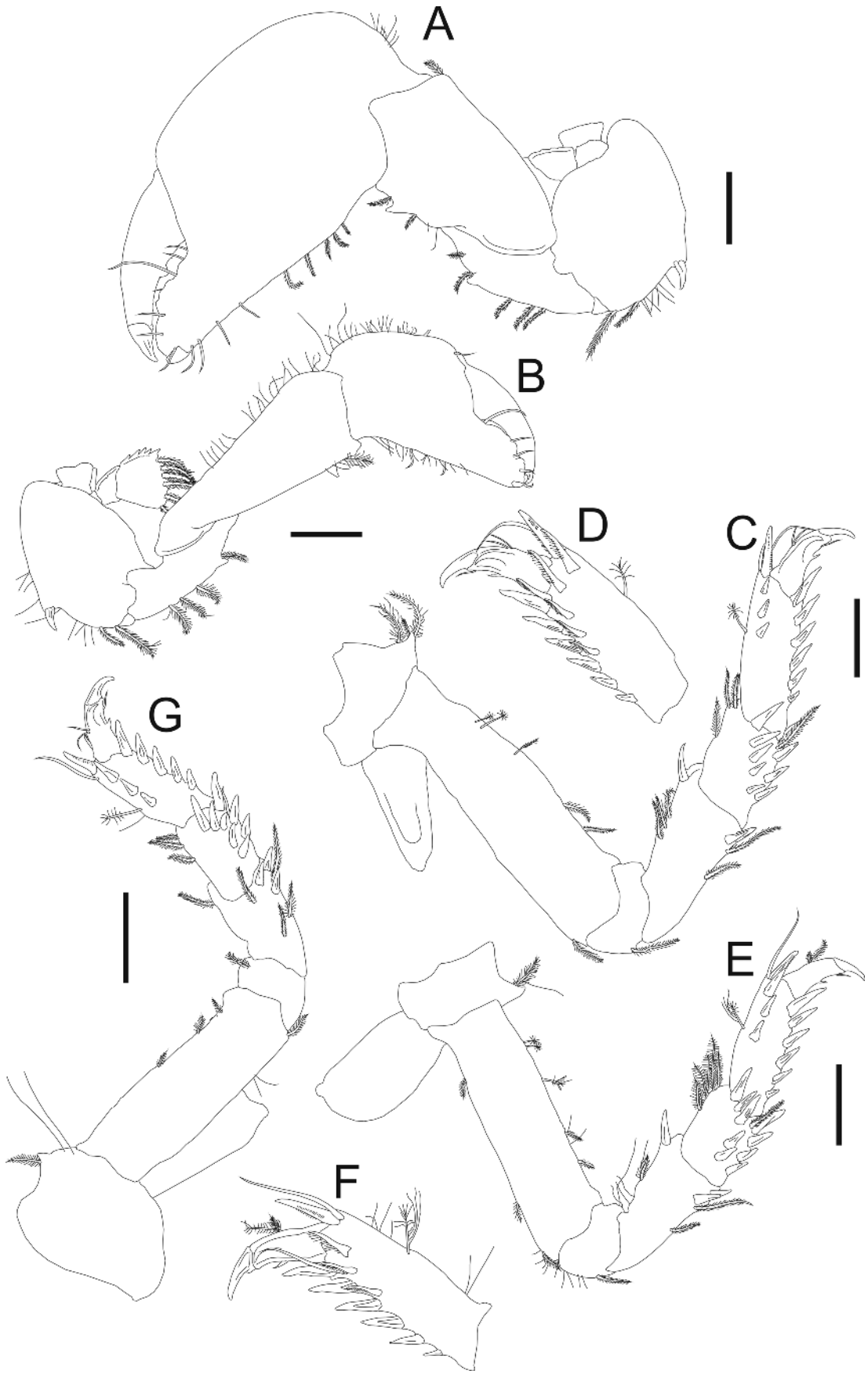

FIGURE 6. *Pseudoapseudomorpha tagopilosus* **sp. nov.** Allotype (NMNS7340-2) male: **A** left cheliped; **B** right cheliped. Holotype (NMNS7340-1) female: **C** right pereopod 1; **D** right pereopod 1 propodus and dactylus medial view; **E** right pereopod 2; **F** right pereopod 2 propodus and dactylus medial view; **G** right pereopod 3. Scale: A–G, 0.1 mm.

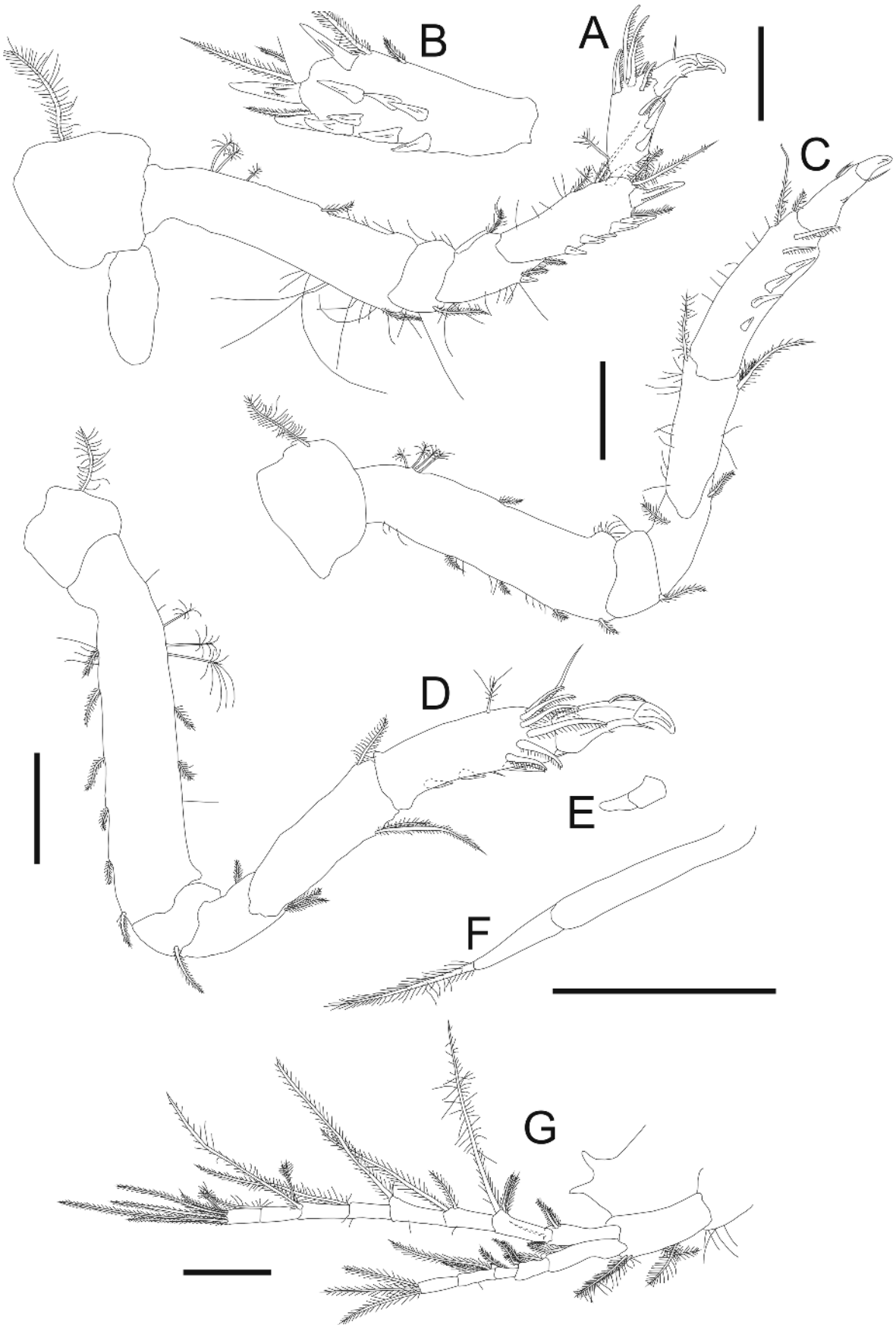

FIGURE 7. *Pseudoapseudomorpha tagopilosus* **sp. nov.** Holotype (NMNS7340-1): **A** right pereopod 4; **B** right pereopod 4 carpus medial view; **C** right pereopod 5; **D** right pereopod 6; **E** left pleopod 3; **F** left pleopod 5; **G** right uropod. Scale: A–G, 0.1 mm.

Antenna (Fig. 4E) over 0.5 times as long as antennule; peduncle five-articled, article 1 inner expansion large and ovate, with many small teeth on inner margin, article 2 longest, 2.5 times as long as wide, with four outer broom setae, two large and three small inner pointed apophyses, one large distal apophysis, and three inner plumose setae, several setules, squama present, with two distal plumose setae, article 3 short, with one large and one short inner distal plumose setae, article 4 about 0.5 times as long as article 2, with four plumose setae and many setules, article 5 as long as article 4, with one inner plumose setae, two strong distal plumose setae, five broom setae and several setules; flagellum three-segmented, segment 1 slightly longer than the peduncle article 3 but narrower than that, with one distal broom seta and five simple setae, segment 2 as long as preceding segment, with one distal broom seta and two simple setae, distal segment with six distal setae.

Right mandible (Fig. 4F) incisor without serrations, setal row with one bifurcate seta and three trifurcate setae; palp three-articled, article 1 shortest, with one plumose seta, article 2 about 2.5 times as long as first article, with ten simple setae and seven pinnate setae, article 3 slightly shorter than the preceding article, with one row of six pinnate setae on inner margin, and one plumose and four simple distal setae. *Left mandible* with strong *lacinia mobilis* (Fig. 4G), setal row with three multifurcate setae; palp similar to right mandible. *Labium* (Fig. 4H) palp covered by setules, with two distal spines; lobe with setules on inner margin. *Maxillule* (Fig. 4I) palp two-articled, with five setae; outer endite with eleven distal spines and with setules on outer margin; inner endite with four distal plumose setae. *Maxilla* (Fig. 5A) outer margin covered by setules; movable endite outer margin with one fine denticle and several setules; movable endite outer lobe with four distal and two subdistal setae, inner lobe with eight distal setae; fixed endite outer lobe with five trifurcate spiniform setae, four pinnate setae and one simple seta, and four fine denticles, inner lobe with one row of 25 setae and four distal pinnate setae. *Maxilliped* basis (Fig. 5B) inner margin with one plumose setae; endite (Fig. 5C) outer margin with setules, inner margin with 18 setae, distal margin with three bifurcate spiniform setae, two long plumose setae, and three simple setae; palp (Fig. 5B) article 1 inner margin with two simple setae; article 2 inner margin with six simple setae and one plumose seta, outer distal corner with one strong spine; article 3 with eight inner setae; article 4 with nine distal setae. *Epignath* (Fig. 5D) cup-shaped, covered by setules, and with one long distal setulate seta.

Cheliped (Fig. 5E–F) exopod three-articled, article 1 small and naked; article 2 dorsal margin with three teeth, article 3 with six distal plumose setae, dorsal margin with five teeth; basis short, about 1.3 times as long as wide, ventral margin with one median spine and four distal plumose setae; merus ventral margin with one apophysis and four plumose setae; carpus 1.8 times as long as wide, with two distodorsal and two distoventral plumose setae; propodus (including fixed finger) 1.3 times as long as carpus, about twice as long as wide, fixed finger outer margin with six setae, incisive margin with five setae; dactylus about 0.5 times as long as propodus.

Pereopods 1–4 with oostegite. *Pereopod 1* (Fig. 6C) coxa with blunt apophysis and three plumose setae; basis with two broom, three plumose dorsal setae, and one distoventral plumose seta; ischium with one distoventral plumose seta; merus with cluster of three dorsal plumose setae and one distodorsal spine, ventral margin with two plumose setae and two distal spines; carpus with three dorsal plumose setae, one ventral plumose seta and two rows of ventral spines (lateral row with five spines and marginal row with four spines); propodus (Fig. 6D) with one dorsal broom seta, one long distodorsal simple seta, one distoventral simple seta, six medial pinnate setae, and two rows of spines (dorsal row with three spines and one large serrated spine, ventral row with six spines); dactylus with two dorsal setae, one ventral seta and denticle. *Pereopod 2* (Fig. 6E) similar to pereopod 1 but coxa with one plumose seta, basis with three ventral plumose setae, merus dorsal margin with one plumose seta and setules, carpus with five dorsal plumose setae, and propodus (Fig. 6F) with three medial pinnate setae. *Pereopod 3* (Fig. 6G) similar to pereopod 1 but coxa with one plumose seta, merus with one dorsal plumose seta, three ventral spines and four ventral plumose setae and without distodorsal spines, carpus marginal row with three spines, propodus with one medial pinnate seta, ventral margin with five spines.

Pereopod 4 (Fig. 7A) coxa with one plumose seta, without apophyses; basis dorsal margin with three broom setae, one plumose setae, and with one distoventral plumose seta; ischium with one distoventral plumose seta; merus with one dorsal plumose seta, two ventral plumose setae and two ventral spines; carpus (Fig. 7B) with five distal plumose setae and two rows of ventral spines (marginal row with six spines, medial row with four spines); propodus with one dorsal broom seta, eight distal pinnate setae, and four ventral spines; dactylus with one dorsal seta, one ventral seta and one denticle. *Pereopod 5* (Fig. 7C) coxa with one plumose seta; basis with dorsal cluster of four broom setae, one dorsal plumose seta, and four ventral plumose setae; ischium with one distoventral plumose seta; merus with one dorsal and two ventral plumose setae; carpus slightly longer than carpus of

pereopods 1–4, with one distodorsal and one distoventral plumose setae; propodus remarkably longer than propodus of pereopods 3–4, with two distal plumose setae, two distal pinnate setae and four ventral spines; dactylus more straight comparing to dactylus of pereopods 1–4, with two dorsal setae, one ventral seta and one denticle. *Pereopod 6* (Fig. 7D) relatively similar to pereopod 5 but basis with three broom setae, two plumose dorsal setae, and six ventral plumose setae; merus with two distoventral setae, carpus slightly longer than carpus of pereopod 5, propodus with one dorsal broom seta, one long simple seta, six distal pinnate setae, and three ventral spines.

Pleopods absent.

Uropod (Fig. 7G) about 1.5 times as long as pleon; basal article with two lateral and two distal plumose setae; exopod with five segments, each segment with one to three distal plumose setae; endopod eight-segmented, segments 1–7 with one to three distal plumose setae, distal segment with five plumose and two broom distal setae.

Male allotype: Similar to female but with unequal chelipeds. *Left cheliped* (Fig. 6A) more robust than female cheliped, with basis as long as wide, carpus 1.5 times as long as wide, and palm 1.4 times as long as wide. *Right cheliped* (Fig. 6B) smaller and thinner than female cheliped, with carpus 2.5 times as long as wide, and palm 1.2 times as long as wide. *Pleopods* uniramous, present only on last three pleonites; first pair (Fig. 7E) very short, two-articled; last two pairs (Fig. 7F) long and slender, two-articled, with one distal plumose seta.

Etymology. The name is derived from the Latin "*tago*" (palp) and "*pilosus*" (hairy), referring to the palp of the mandible covered by many setae.

Type locality. Jihuei, eastern Taiwan.

Distribution. It is only known from Jihuei and Jialulan, eastern Taiwan.

Remarks. According to the key given by Guţu (2009), the *Pseudoapseudomorpha tagopilosus* sp. nov. is most similar to *Pseudoapseudomorpha ornata*, which is also the geographically nearest species (recorded from Malaysia). Both species share: 1) presence of one long lateral seta on pleonites 2–3, 2) pleopods only on pleonites 3–5 in the male but absent in the female, and 3) presence of teeth on the dorsal margin of the cheliped exopod (Guţu 2006: Figs 354–376; present study: Figs 4–7, Table 2). However, the new species can be distinguished from *P. ornata* by having one long lateral seta on pleonite 4, a four-segmented antennule outer flagellum, five setae on the maxillule palp article 2, six distal plumose setae on the cheliped exopod, six ventral spines on the propodus of pereopod 1, six marginal and four medial spines on the ventral margin of pereopod 4 carpus, and the male with a vestigial pleopod (only on pleonite 3). Moreover, the small cheliped of the male of *P. tagopilosus* is smaller and thinner than the female's cheliped, compared to the similar size of the same cheliped forms in *P. ornata* (Guţu 2006: Figs 354–376; present study: Figs 4–7, Table 2).

Subfamily Synapseudinae Guţu, 1972

Genus *Synapseudes* Miller, 1940

***Type species Synapseudes minutus* Miller**

***Synapseudes hansmuelleri* Guţu, 2006**
Figs 8

Synapseudes hansmuelleri Guţu, 2006: 227, Figs 441–453.

Material examined. One female (NMNS7341-1), 1.6 mm, one male (NMNS7341-2), 1.5 mm, seven females (NMNS7341-6), twelve males (NMNS7341-7), twelve males (NMNS7341-8), Jihuei (23°06'54.9"N, 121°24'16.3"E), eastern Taiwan, collected by You-Wei Tzeng, October 7, 2010; one female (NMNS7341-3), one male (NMNS7341-4), 1.2 mm, Jihuei (23°06'54.9"N, 121°24'16.3"E), eastern Taiwan, intertidal, washing from polychaetous worm tube of *Eunice taoi* Hsueh & Li, collected by You-Wei Tzeng, March 25, 2011; one female (NMNS7341-5), Shanyuan (22°50'12.6"N, 121°11'18.0"E), eastern Taiwan, intertidal, washing from red alga *Laurencia brongniartii* Agardh, collected by You-Wei Tzeng, August 8, 2011.

Remarks. *Synapseudes hansmuelleri* is the most common apseudomorphan tanaidacean encountered in the present study, with over 500 individuals collected. The morphology of these specimens agrees very well with the

original description of the species by Guţu (2006). Yet, the present study adds descriptions of three body parts which are not described by Guţu (2006). In our specimen (Fig. 8A), female's labium palp (Fig. 8B) has one distal spine and the lobe's distomedial margin has two setae and setules; the maxilla (Fig. 8C) movable endite outer and inner lobes both have five distal setae, and the fixed endite outer lobe has two bifurcate spiniform setae and two plumose and one simple setae, whereas inner lobe has eleven setae; the epignath (Fig. 8D) is curled and covered by setules, and has one apical seta.

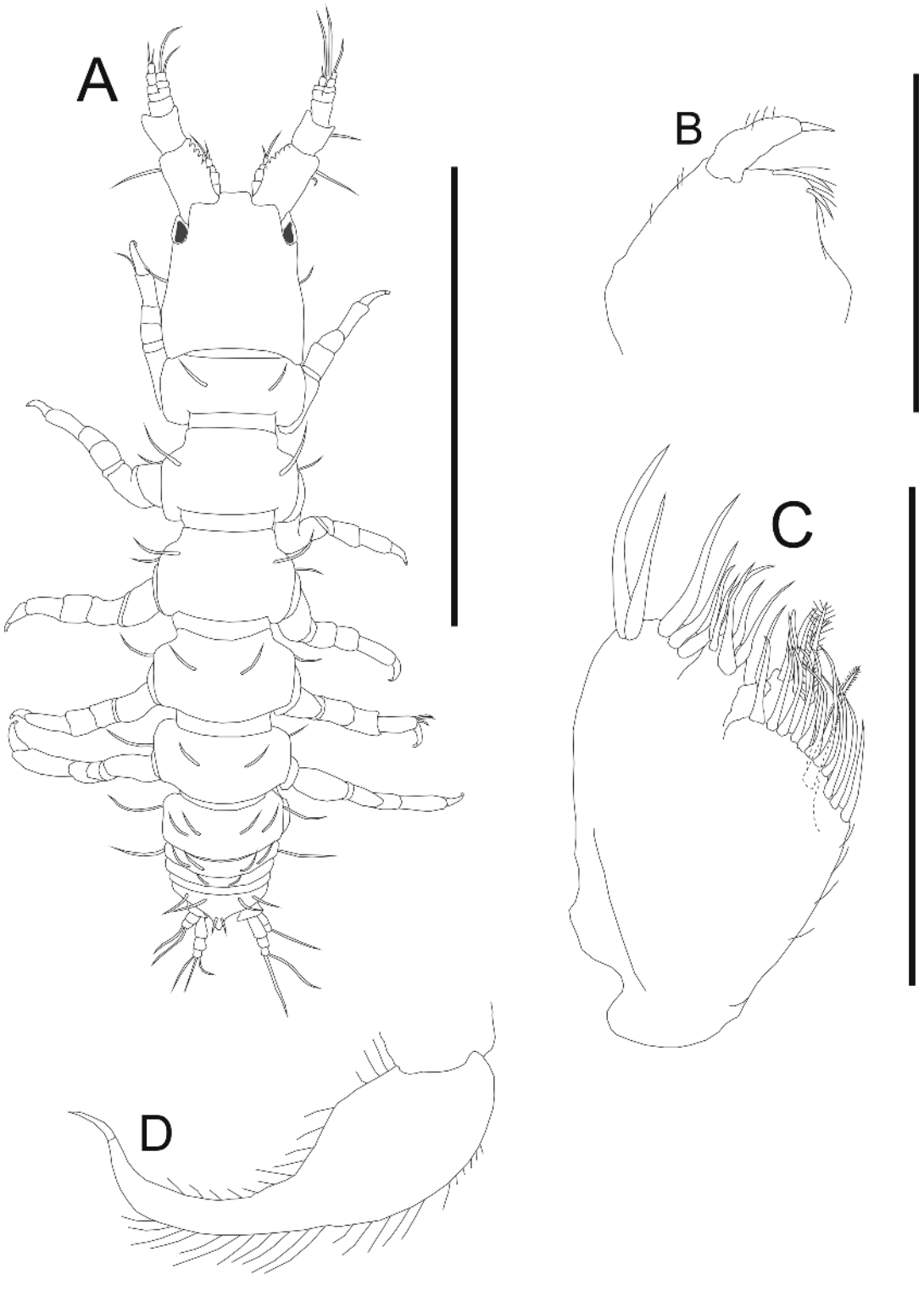

FIGURE 8. *Synapseudes hansmuelleri* female (NMNS7341-1): **A** body dorsal view; **B** left half of labium; **C** maxilla; **D** epignath. Scale: A, 1 mm; B–D, 0.1 mm.

Most of specimens of this species collected in the present study are from washings of polychaetous worm tubes, in comparison to dead corals covered with algae, sponges, hydroids and ascidians in Guţu (2006). *Synapseudes hansmuelleri* is currently found only from two distant geographic locations (Northwestern of the Babi Besar Pulau, Tioman Archipelago, South China Sea and central East Taiwan) (Guţu 2006 & present study).

Family Pagurapseudidae Lang, 1970

Subfamily Hodometricinae Guţu, 1981

***Indoapseudes* Băcescu, 1976**

Type species. *Indoapseudes brycesoni* Băcescu, 1976

Remarks. Four species, *Indoapseudes brycesoni, Indoapseudes choristhema* Bamber 2007*, Indoapseudes macabre* Bamber, 2005, and *Indoapseudes secundus* Guţu, 1997, are currently recognized in the genus and all are from the Indo-West Pacific region (Băcescu 1976, Guţu 1997, Bamber 2005, 2007). The present study adds one species to the genus from the same area.

***Indoapseudes multituberculata* sp. nov.**
Figs 9–12

Material examined. *Holotype*: non-ovigerous female (NMNS7342-1), 2.8 mm, Jihuei (23°06'54.9"N, 121°24'16.3"E), eastern Taiwan, intertidal, washing from red alga *Mastophora* sp., collected by You-Wei Tzeng, April 18, 2012.

Paratype: one female (NMNS7341-2), 1.9 mm, Jihuei (23°06'54.9"N, 121°24'16.3"E), eastern Taiwan, intertidal, washing from red alga *Mastophora* sp., collected by You-Wei Tzeng, August 8, 2012.

Diagnosis. *Female*: *Body* cylindrical, posterior narrower progressively. *Cephalothorax* subrectangular, rostrum denticulate down-curved. *Pleotelson* terminal point covered with tubercles. *Antennule* outer flagellum eight-segmented, inner flagellum five-segmented. *Antenna* squama absent, flagellum three-segmented. *Mandible* palp article 1 distal margin with row of teeth. *Cheliped* carpus slender, with one dorsal and two ventral spine-like apophyses. *Pleopods* 1–3 absent, last two pairs reduced.

Description. *Holotype*: *Habitus* (Fig. 9A) body cylindrical and highly calcified, about six times as long as wide. *Cephalothorax* subrectangular from dorsal view, 1.3 times as long as wide, about 0.2 times as long as body; rostrum denticulate, down-curved; eye lobes well-developed, fully separated from carapace, pigmented. *Pereon* narrower progressively from pereonites 1 to 6; pereonites 1–3 naked laterally; pereonite 4 longest, with three lateral projections; pereonites 5–6 with two lateral projections. *Pleon* (Fig. 9D) thin cylindrical, narrower than pereonite 6; each pleonite with one pair of dorsal setae. *Pleotelson* with two dorsal setae, lateral margin with three tubercles and several setae, apex covered with about ten tubercles.

Antennule (Fig. 9B) about twice as long as cephalothorax; peduncle article 1 about 0.5 times as long as antennule, outer margin with seven pointed apophyses, one distal large apophysis, and about ten broom setae, inner margin with ten pointed apophyses, one distal apophysis, and one or two broom setae between each apophysis; article 2 with more than eight broom setae; article 3 two times as long as article 2, with four broom setae, one simple seta, and some setules; article 4 naked; outer flagellum eight-segmented, segments 4, 5 and 7 each with one aesthetasc, distal segment with six setae and one broom seta; inner flagellum five-segmented, with four setae and one broom seta.

Antenna (Fig. 9C) squama absent, nearly 0.3 times as long as antennule; peduncle five-articled, article 1 inner expansion ovate, with denticulate inner margin, article 2 twice as long as article 1, with single outer broom seta and five acute apophyses on inner margin, article 3 short, with single distal broom seta, article 4 with two broom setae and several setules, article 5 about as long as article 4, with four broom setae and several setules; flagellum three-segmented, segments 1–2 shorter than peduncle article 5, with one distal broom seta on each segment, distal segment shortest, with one broom seta and three long distal simple setae.

Left mandible (Fig. 9E) incisor process not studied (body part incomplete); palp three-articled, article 1 with three inner plumose setae and five distal teeth, article 2 with seven inner and five outer setae, article 3 with 13 setae on inner margin. *Right mandible* (Fig. 9F) as left but without *lacinia mobilis*; setal row of two bifurcate and three multifurcate spiniform setae and one simple seta. *Labium* (Fig. 10A) palp surface covered by numerous long setules and with two distal setae; lobe covered by numerous setules. *Maxillule* (Fig. 10B) outer endite with eleven distal spines and one simple seta, outer margin covered with setules; inner endite with five distal plumose setae; palp present. *Maxilla* (Fig. 10C) movable endite outer margin with several setules, movable endite outer lobe with four distal and two subdistal setae; movable endite inner lobe with eight setae; outer lobe of fixed endite with eight distal setae, five multifurcate spiniform setae, and one serrated spine, outer margin with fine denticles; inner lobe of fixed endite with row of 18 setae and four long pinnate setae. *Maxilliped* (Fig. 10D) coxa short; basis naked; endite inner margin with three coupling hooks and several setae, distal margin with six multiform setae (Fig. 10E), two pinnate setae and five simple setae; palp article 1 naked, article 2 with 13 inner setae and one plumose seta at the outer distal corner, articles 3 and 4 both with seven distal setae. *Epignath* (Fig. 10F) cup-shaped, with one distal seta.

Cheliped (Fig. 11A) exopod (Fig. 11B) present, three-articled, distal article with three plumose setae; basis about twice as long as wide, dorsal margin with two large proximal plumose setae, three simple setae, and rows of irregular-sized denticles, ventral margin with three broom setae, distoventral margin with one strong apophysis and seven plumose setae; merus with one strong ventral apophysis and two broom setae; carpus long, two times as long as basis, with several broom setae, one distodorsal apophysis, one proximoventral and one distoventral apophysis; propodus (including fixed finger) about 0.65 times as long as carpus, with 13 simple setae on ventral, distal and incisive margins; dactylus 0.5 times as long as propodus, with five simple setae on incisive margin and two broom setae on dorsal margin.

Pereopods all thin, stick-like. *Pereopod 1* (Fig. 11C) exopod absent; coxa with prominent apophysis and three adjacent plumose setae; basis dorsal margin with eight pointed apophyses and more than eight plumose setae, ventral margin with about nine plumose setae; ischium with three plumose setae; merus with four plumose setae and three simple setae; carpus with five distodorsal setae, six lateral spines, and seven ventral spines; propodus dorsal margin with one simple and one broom setae, three distal pinnate setae, and one distal spine, distal margin with four simple setae, ventral margin with five lateral and six marginal spines; dactylus with two dorsal setae, one ventral seta, and one ventral process near unguis. *Pereopod 2* (Fig. 11D) similar to pereopod 1, but coxa without plumose setae, basis with more plumose setae and five dorsal pointed apophyses, carpus with five lateral spines, propodus without serrated setae. *Pereopod 3* (Fig. 11E) similar to pereopod 2 but basis with four dorsal apophyses and few plumose setae, ischium with one plumose setae, merus with three plumose setae, carpus with four lateral and five ventral spines, propodus with three dorsal broom setae and four ventral lateral spines. *Pereopod 4* (Fig. 12A) coxa without apophyses or setae; basis with four dorsal broom setae, three dorsal apophyses, seven plumose setae on dorsal and nine plumose setae on ventral margin; ischium with one ventral seta; merus with three dorsal plumose setae, two ventral setae, and one distoventral spine; carpus with two dorsal, three lateral and two ventral setae, and one distoventral spine; propodus with one simple seta and two broom setae on dorsal margin, ventral margin with three spines and two setae, distal margin with eight strong pinnate setae; dactylus with one ventral process. *Pereopod 5* (Fig. 12B) coxa without apophyses, with one short seta; basis dorsal margin with three broom setae, four apophyses, and six plumose setae, ventral margin with eight plumose setae; ischium with two ventral setae; merus with one dorsal plumose seta, one plumose distoventral seta and one simple distoventral setae; carpus with one plumose seta and three simple setae; propodus with one dorsal seta, one simple, one plumose and one broom distodorsal seta, ventral margin with five simple setae and one lateral seta; dactylus with one ventral process. *Pereopod 6* (Fig. 12C) similar to pereopod 5 but basis dorsal margin with two apophyses and eight plumose setae, ischium with two dorsal plumose setae; carpus with eight simple setae, propodus without plumose setae, and ventral margin with five spines.

Pleopod (Fig. 9D) only on pleonites 4–5, reduced and uniramous, with one distal simple seta.

Uropod (Fig. 12D) basis with two distal setae; exopod three-segmented, with two distal setae; endopod eight-segmented, with many setules, segment 2 with two broom setae and one simple distal seta, segment 3 with one distal seta, segment 4 with three distal setae, segment 5 with one distal seta, segment 6 with three distal setae, segment 7 without setae, and segment 8 with five distal setae.

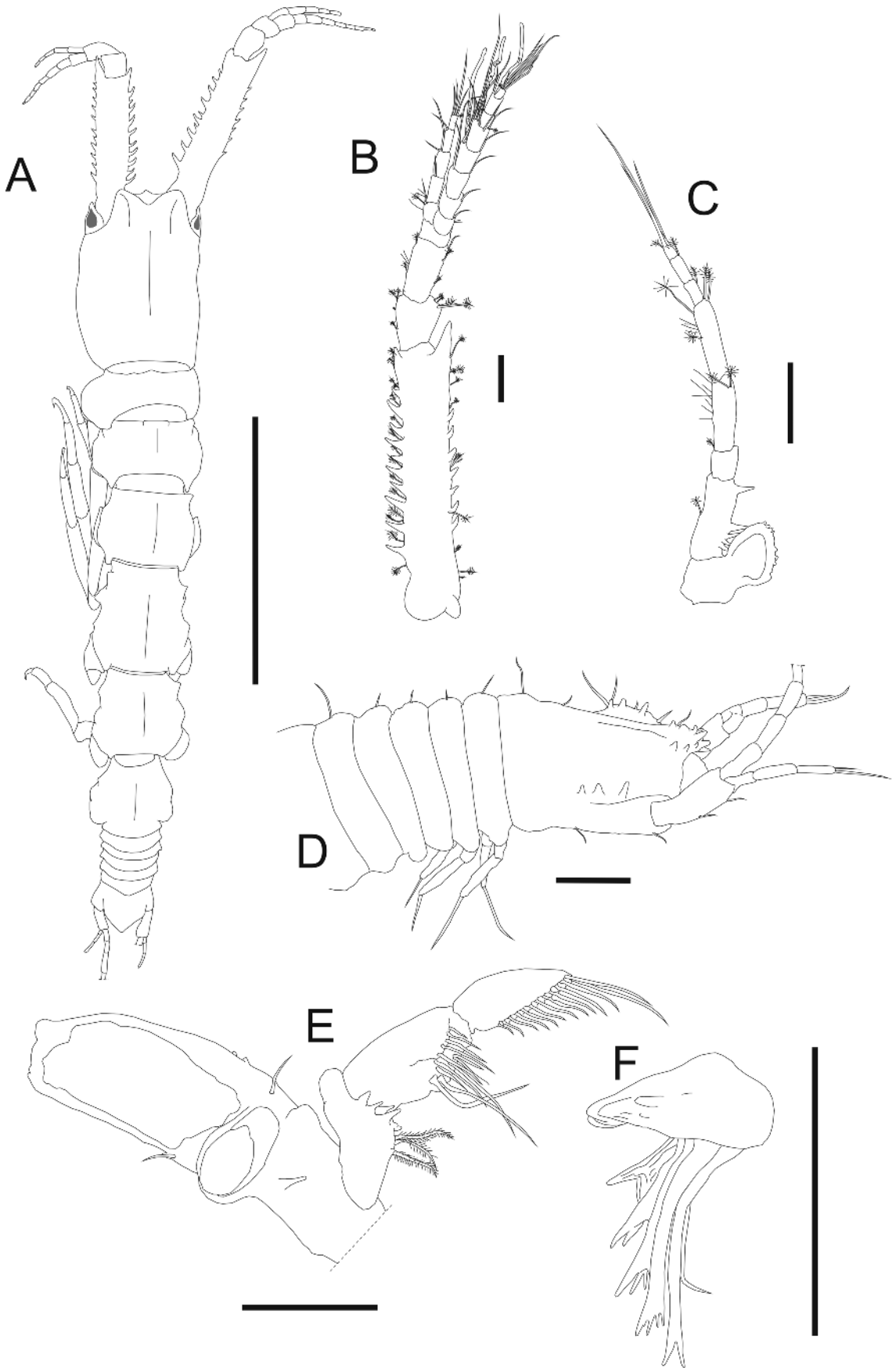

FIGURE 9. *Indoapseudes multituberculata* **sp. nov.** Holotype (NMNS7342-1) female: **A** body dorsal view; **B** right antennule; **C** left antenna; **D** pleon; E left mandible; **F** right mandible incisor and setal row. Scale: A, 1 mm; B–F, 0.1 mm.

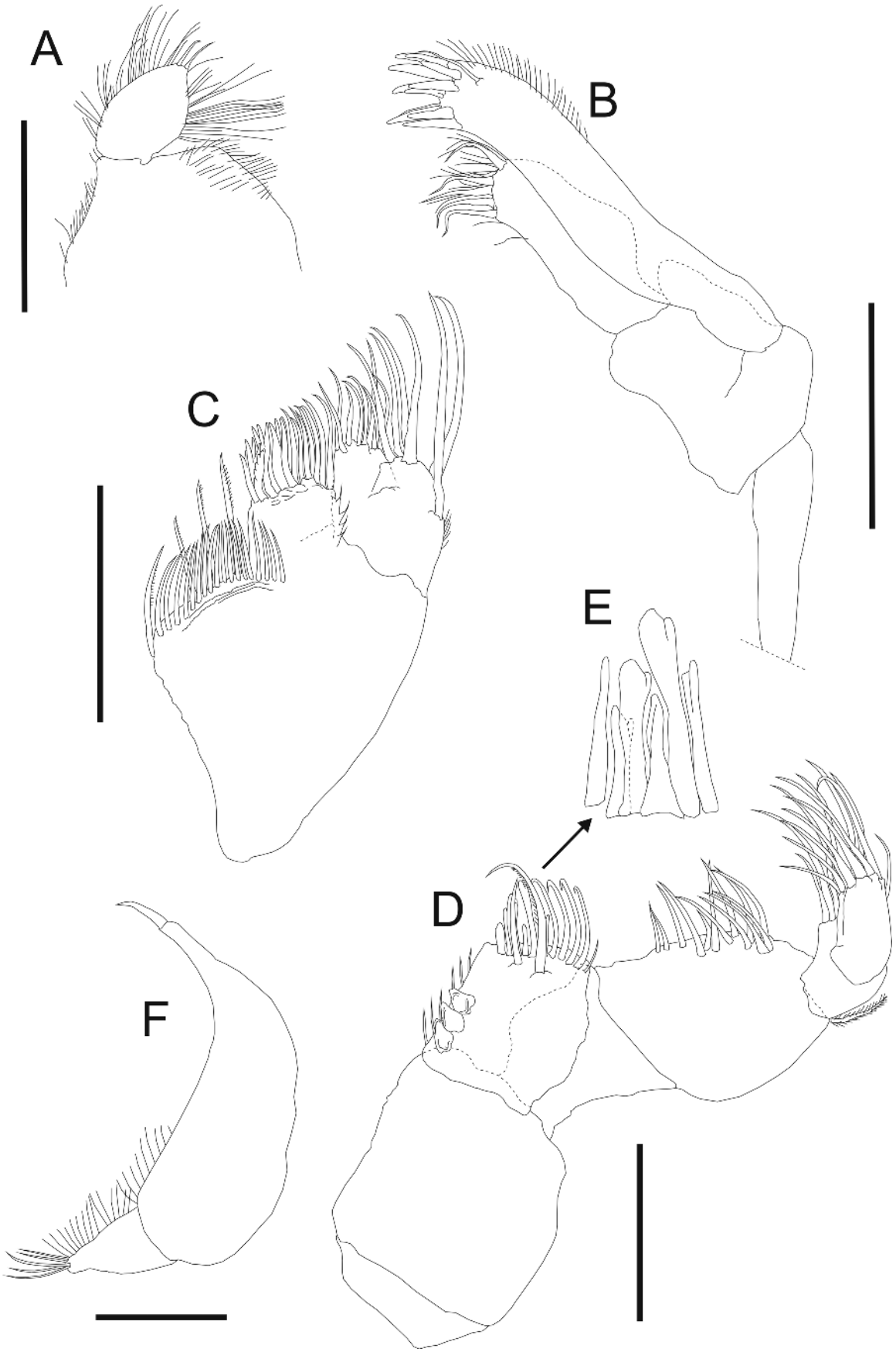

FIGURE 10. *Indoapseudes multituberculata* **sp. nov.** Holotype (NMNS7342-1) female: **A** left half of labium; **B** right maxillule; **C** maxilla; **D** right maxilliped; **E** right maxilliped endite distal spiniform setae; **F** epignath. Scale: A–F, 0.1 mm.

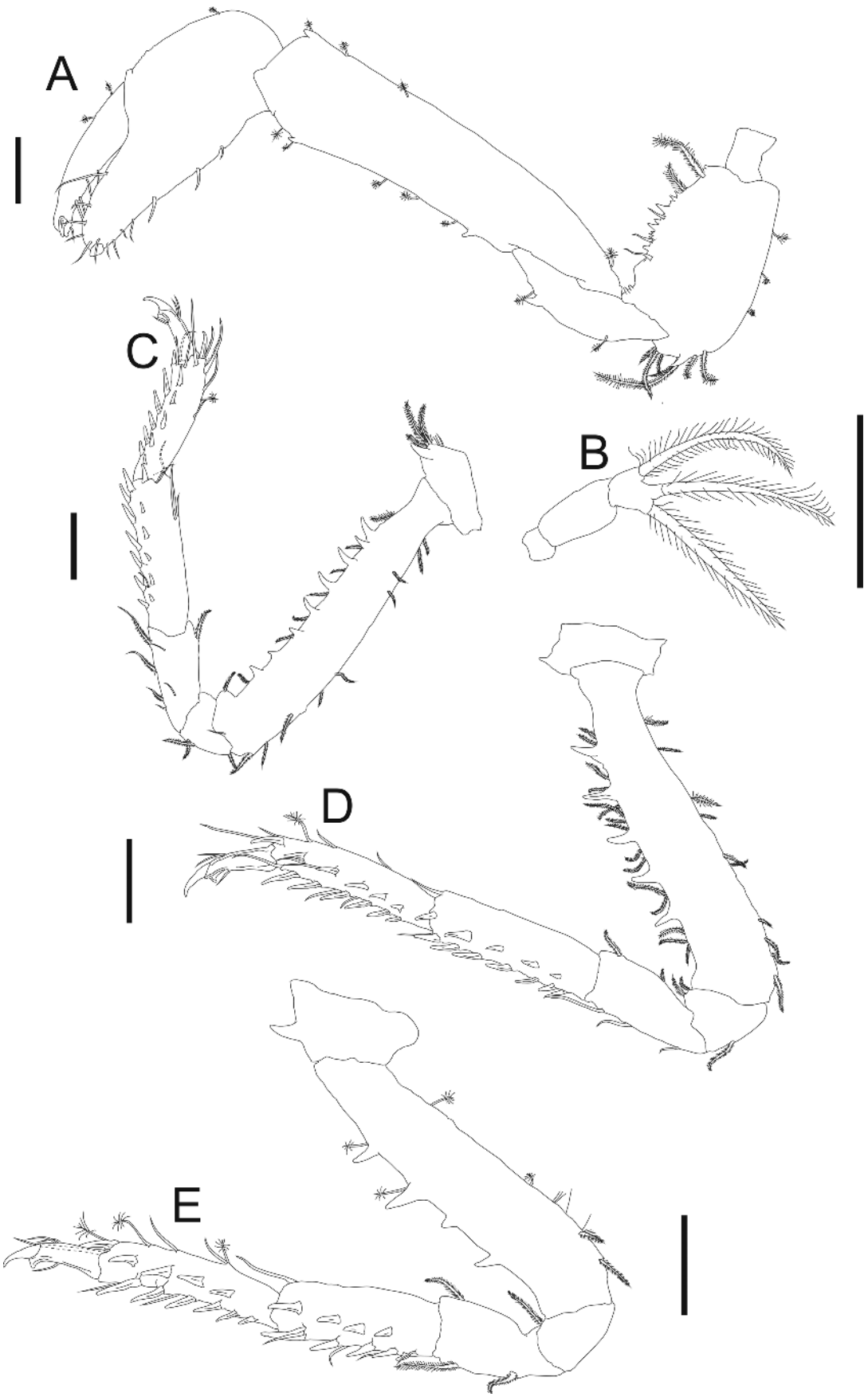

FIGURE 11. *Indoapseudes multituberculata* **sp. nov.** Holotype (NMNS7342-1) female: **A** left cheliped; **B** paratype female (NMNS7341-2), right cheliped exopod; **C–E** left pereopods 1–3, respectively. Scale: A–D, 0.1 mm.

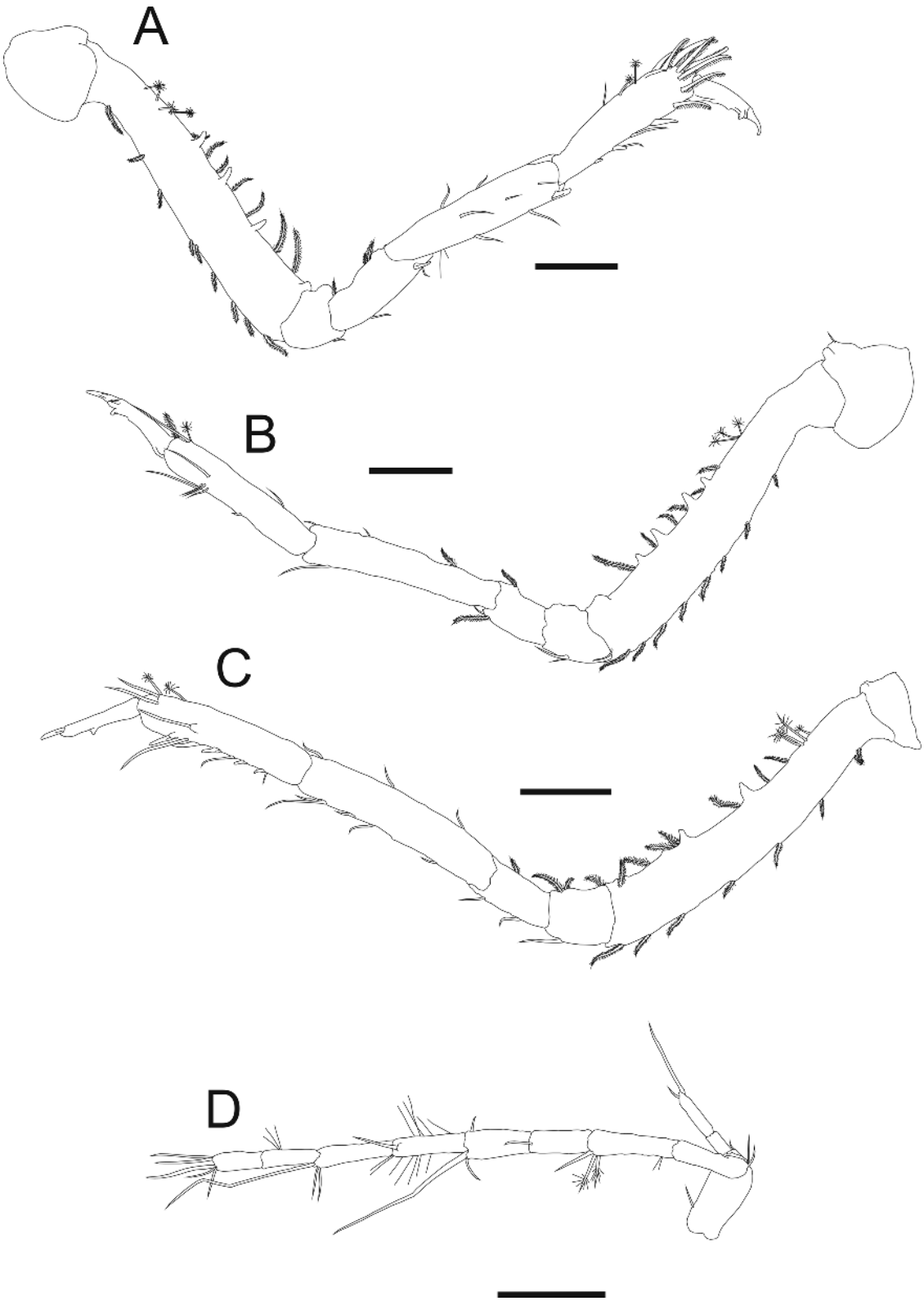

FIGURE 12. *Indoapseudes multituberculata* **sp. nov.** Holotype (NMNS7342-1) female: **A** right pereopod 4; **B–C** left pereopods 5–6, respectively; **D** paratype female (NMNS7341-2), left uropod. Scale: A–D, 0.1 mm.

Etymology. The name is derived from the Latin "*multi*" (many) and "*tuberculata*" (tubercles), referring to the presence of many tubercles terminally on pleotelson in described species.

Type locality. Jihuei, eastern Taiwan.

Distribution. It is only known from the type locality.

TABLE 2. Key morphological characters of all species described for *Pseudoapseudomorpha*. References: Edgar (1997), Guţu (1991b), Guţu (2006), Guţu (2009), Guţu & Ortiz (2009). NA = not available from original description.

	Antennule outer/inner flagellum segments	Cheliped exopod dorsal teeth	Female pleopods	Male pleopods	Uropod exopod/endopod segments
P. tagopilosus **sp. nov.**	4/3	present	absent	present on pleonite 3–5 (first pair very short)	5/8
P. curtisetosa	6/3	present	NA	present on pleonites 3 5	4/7
P. gomezi	6/3	NA	absent	present on pleonites 3–5	4/7–8
P. madagascariensis	5/2	NA	present on pleonites 1–2 (juvenile)		4/8
P. ornata	6/3	present	absent	present on pleonites 3–5	5/9
P. tanzaniana	5/3	absent	present on pleonites 1 2	present on pleonites 1 2	5/10
P. wagait	5–7/2	absent	present on pleonites 1–3	NA	5–4/9

TABLE 3. Key morphological characters of all species described for *Indoapseudes*. References: Băcescu (1976), Bamber (2005), Bamber (2007), Guţu (1997), Guţu (2006). NA – not available from original description. * Indicates data are obtained from counting uropod exopod segments of Fig. 17A in Bamber (2005).

	Rostrum	Pleotelson apex	Antennule inner/outer flagellum segments	Antenna flagellum segments	Antenna squama	Cheliped exopod	Female pleopods	Male pleopods	Uropod exopod/endopod segments
I. multituberculata **sp. nov.**	denticulate down-curved	many tubercles	8/5	3	absent	present	present on pleonites4–5	NA	3/8
I. brycesoni	denticulate down-curved	3 spines	6/4	2	absent	present	absent	present on pleonites 4–5	3/9
I. choristhema	absent	2 setae	6/3	absent	absent	absent	absent	NA	3/missing
I. macabre	small, central pointed	naked	8/5	3	present	present	absent	present on pleonites 1 3	5/20*
I. secundus	small, central pointed	2 spines	6/4	3	present	present	absent	present on pleonites 4–5	3/8

Remarks. The present species, *Indoapseudes multituberculata* **sp. nov.,** is undoubtedly morphologically different from its currently known congeners. Table 3 shows that *I. multituberculata* has only few morphological characters that are similar to any other *Indoapseudes* species (Table 3). Moreover, it has three unique morphological characters which are not seen in the other species: 1) females having two pairs of pleopods (on pleonites 4–5), 2) the pleotelson with many apical tubercles, 3) mandible palp article 1 with noticeable distal teeth (Fig. 9D–E; Table 3).

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References

Băcescu, M. (1976) Three new genera and six new species of Monokonophora (Crustacea, Tanaidacea) from the coral reefs of Tanzania. *University Science Journal (University of Dar es Salaam)*, 2, 3–24.

Băcescu, M. (1980) *Apseudes bermudeus*, n. sp. from caves around Bermude Islands. *Acta Adriatica*, 21, 401–407.

Bamber, R.N. (1997) Peracarid crustaceans from Cape d´Aguilar and Hong Kong, II. Tanaidacea: Apseudomorpha. *In*: Morton, B. (Ed.), *The Marine Flora and Fauna of Hong Kong and Southern China IV. Proceedings of the Eighth International Marine Biological Workshop: The Marine Flora and Fauna of Hong Kong and southern China, Hong Kong, 2-20 April 1995.* Hong Kong University Press, Hong Kong, pp. 87–102.

Bamber, R.N. (2005) The tanaidaceans (Arthropoda: Crustacea: Peracarida: Tanaidacea) of Esperance, Western Australia, Australia. *In*: Wells, F.E., Walker, D.I. & Kendrick, G.A. (Eds.), *The Marine Flora and Fauna of Esperance, Western Australia*. Western Australian Museum, Perth, pp. 613–728.

Bamber, R.N. (2007) New apseudomorph tanaidaceans (Crustacea, Peracarida, Tanaidacea) from the bathyal slope off New Caledonia. *Zoosystema*, 29 (1), 51–81.

Bamber, R.N. & Błażewicz-Paszkowycz, M. (2013) Another inordinate fondness: diversity of the tanaidacean fauna of Australia, with description of three new taxa. *Journal of Natural History*, 47 (25–28), 1767–1789. http://dx.doi.org/10.1080/00222933.2012.742164

Bamber, R.N. (2014) Two new species of *Sinelobus* Sieg, 1980 (Crustacea: Tanaidacea: Tanaididae), and a correction to the higher taxonomic nomenclature. *Journal of Natural History*, 48 (33–34), 2049–2068. http://dx.doi.org/10.1080/00222933.2014.897767

Błażewicz-Paszkowycz, M. & Bamber, R.N. (2012) The shallow-water Tanaidacea (Arthropoda: Malacostraca: Peracarida) of the Bass Strait, Victoria, Australia (other than the Tanaidae). *Memoirs of Museum Victoria*, 69, 1–235.

Edgar, G.J. (1997) A new genus and three new species of Apseudomorph tanaidacean (Crustacea) from the Darwin region. *In*: Hanly, J.R., Caswell, G., Megirian, D. & Larson, H.K. (Eds.), *Proceedings of the Sixth International Marine Biological Workshop. The Marine Flora and Fauna of Darwin Harbour, Northern Territory, Australia.* Museums and Art Galleries of the Northern Territory and the Australian Marine Science Association, Darwin, Australia, pp. 279–299.

Guţu, M. (1991a) The description of *Paradoxapseudes cubensis*, a new genus and new species of Tanapseudidae (Crustacea, Tanaidacea). *Travaux du Muséum National d´Histoire naturelle "Grigore Antipa"*, 31, 349–354.

Guţu, M. (1991b) The description of a new genus and of two new species of Tanaidacea (Crustacea) from western Indian Ocean. *Travaux du Muséum National d´Histoire naturelle "Grigore Antipa"*, 31, 355–364.

Guţu, M. (1997) Tanaidacea. *In*: Guţu, M. (Ed), *Results of the Zoological Expedition Organized by "Grigore Antipa" Museum in the Indonesia Archipelago (1991). I. Peracarida (Crustacea). Travaux du Muséum National d´Histoire naturelle "Grigore Antipa"*. Bucharest, pp. 259–327.

Guţu, M. (2001) New changes in the systematics of the suborder Apseudomorpha (Crustacea: Tanaidacea). *Travaux du Museum National d'Histoire Naturelle "Grigore Antipa"*, 43, 65–71.

Guţu, M. (2006) *New Apseudomorph Taxa of the World Ocean: Crustacea, Tanaidacea.* Curtea Veche, Bucharest, Romania, 318 pp.

Guţu, M. (2007) Contribution to the knowledge of the Indo-West-Pacific Apseudomorpha (Crustacea: Tanaidacea). *Travaux du Muséum National d´Histoire Naturelle "Grigore Antipa"*, 50, 47–86.

Guţu, M. (2008) New data on the genus *Paradoxapseudes* Guţu, 1991, including the description of a new species. The synonymysation of *Gollumudes* Bamber, 2000 with *Paradoxapseudes* and the description of a new apseudid genus. *Travaux du Museum National d'Histoire Naturelle "Grigore Antipa"*, 51, 17–42.

Guţu, M. (2009) A contribution to the knowledge of metapseudids. Description of a new genus and three new species from the Caribbean Sea and the Indian Ocean (Crustacea: Tanaidacea: Apseudomorpha). *Travaux du Museum National d'Histoire Naturelle*, 52, 101–125.

Gutu, M. & Ortiz, M. (2009) A new genus and two new species of metapseudids from the southern waters of Cuba (Crustacea: Tanaidacea: Apseudomorpha). *Travaux du Muséum National d´Histoire naturelle "Grigore Antipa"*, 52, 87–99.

Hansen, H.J. (1895) Isopoden, Cumaceen und Stomatopoden der Plankton-Expedition. *Ergebnisse der Plankton-Expedition der Humboldt-Stiftung*, 2, 1–105.
http://dx.doi.org/10.5962/bhl.title.10413

Larsen, K. (2003) Proposed new standardized anatomical terminology for Tanaidacea (Peracarida). *Journal of Crustacean Biology*, 23 (3), 644–661.
http://dx.doi.org/10.1651/c-2363

Menzies, R.J. (1953) The *Apseudid Chelifera* of the eastern tropical and north temperate Pacific Ocean. *Bulletin of the Museum of Comparative Zoology at Harvard College*, 107, 443–496.

Miller, M.A. (1940) The isopod Crustacea of the Hawaiian Islands (Chelifera and Valvifera). *Occasional Papers of the Bernice P. Bishop Museum, Honolulu*, 15 (26), 295–361.

Shiino, S.M. (1952) A new genus and two new species of the order Tanaidacea found at Seto. *Publications of the Seto Marine Biological Laboratory*, 2, 53–68.

Sieg, J. (1986) Crustacea Tanaidacea of the Antarctic and the Subantarctic. 1. On material collected at Tierra del Fuego, Isla de los Estados, and the west coast of the Antarctic Peninsula. *In*: Korniker, L.S. (Ed.), *Biology of the Antarctic Seas XVIII*. Antarctic Research Series, Washington, pp. 1–180.

Tzeng, Y.-W. & Hsueh, P.-W. (2014) Two new species of Tanaidacea (Crustacea, Peracarida) from Taiwan. *Zootaxa*, 3802 (1), 51–64.
http://dx.doi.org/10.11646/zootaxa.3802.1.4